

MEMORANDUM

DATE: June 4, 2018

TO: Mr. Joseph Strach - MDNR

FROM: Sam Jablonowski, PE

RE: Riverwoods Site Utility Investigation

Abonmarche was retained by South Haven Township to perform a site utility investigation for the "Riverwoods" property, located in South Haven Township, in which the MDNR has an interest. The site is located to the west of I-196, to the east of Blue Star Highway, the north of 2nd Avenue, and the south of the Black River. The overall parcel is 59.64 acres.

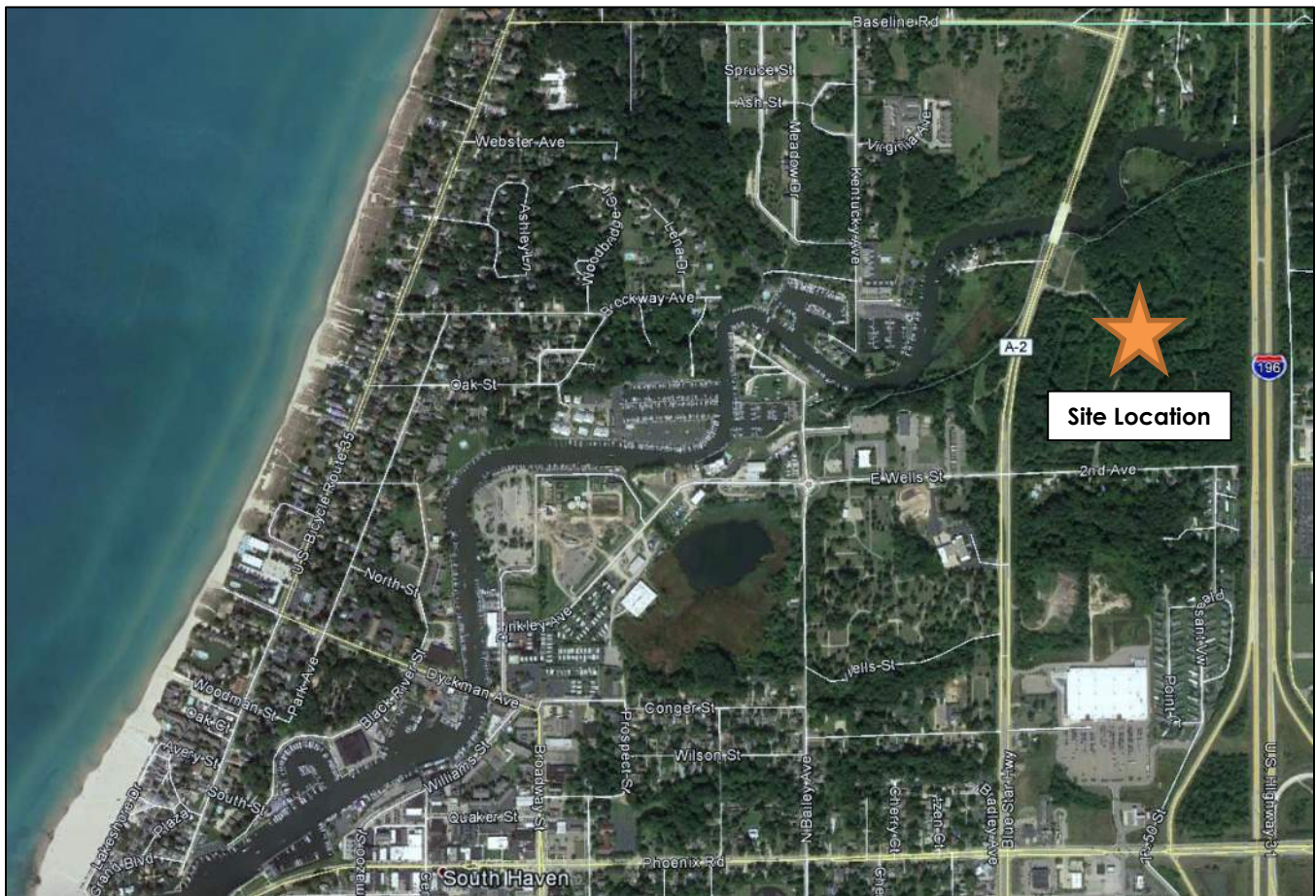


Figure 1: Riverwoods Site Location Map

Background

The Riverwoods site was originally intended to be a residential subdivision developed in four phases with an ultimate buildout of 167 units and a clubhouse. Due to the financial downturn in 2008/2009, construction was halted after the initial phase of utility improvements was completed.

The first phase of work was intended to service 39 residential units and provide the critical utility improvements to which the additional phases of construction would connect. These improvements included water main, sanitary sewer, storm sewer, electrical distribution, gas main, and hot mix asphalt (HMA) pavement.

The goal of this utility investigation was to review the condition of the existing assets within the subdivision for potential future use as a campground development. This report is broken down into sections discussing the various utilities which were studied as a part of this assessment and includes the following:

- Water System
- Electrical System
- Sanitary Sewer System
- Storm Sewer System
- Pavement
- Gas Distribution Network

The review of utilities which was conducted in March 2018 to May 2018.

Water System

A site visit was conducted on March 28, 2018 to verify the extent of the water main buildout on the site. Each critical component of the system was reviewed and is described in further detail below.

Water Main

The first phase of development installed approximately 2,900 feet of new 8 inch ductile iron water main. Seven (7) valves were also installed on the main which allow for isolation of various portions of the system as required for repairs, maintenance, or connections. The main, as shown in the previous project's design drawings, is shown to be installed at a minimum depth of cover of 5 foot 9 inches which would properly insulate it from the impact of frost. The mains on site are connected to the existing 12 inch water main located on the south side of 2nd Avenue near the western edge of the development. This main is operational and is flushed regularly.

Additional improvements are not expected to be needed to this water main as it is currently constructed. The system can be expanded into the adjacent phases by



isolating the existing mains and connecting to the currently capped stubs of main at the phase limits.

Water Services

The original Riverwoods development plans show a total of 39 water services which were to be installed as part of the first phase of work. These services are tapped off of the new water main installed outside of the roadway limits and connected to a curb stop in the parkway area. Water services were suspected to be installed as there were wooden stakes and upturned HDPE pipe located at what appeared to be the ROW limits where the services would have terminated, however, we were unable to verify this condition with certainty.

Fire Hydrants

Six (6) fire hydrants were installed as part of the original phase of development for the project. These hydrants have been maintained since their installation by South Haven Area Emergency Services (SHAES), which flushes the hydrants and checks their operational condition yearly. There have been no reported issues with the hydrants located onsite.

As part of the hydrant review process, flow testing was completed to provide a baseline of what flow could be expected throughout the development as it is currently constructed. This flow testing was completed on April 2, 2018 by SHAES with Abonmarche as a witness to the testing. The hydrant flow achieved during testing was 1,048 GPM with an estimated available flow at 20 PSI of 2,400 GPM. This flow value at 20 PSI places the rated capacity of these hydrants in the Class AA category which is the highest (best) rating category. The results of this testing are attached following this report for further information.

Electrical System

The City of South Haven Electrical Department was contacted to review and comment on the condition and extents of the electrical system within the development. The system has been energized since 2009 or 2010 and was built completely for the Phase I area with primary service. Drawings of the extent of this system are attached to this memo for reference. No secondary service to individual lots has been provided at this time. The City charges \$8 per foot per trench line to provide a service line for each lot with additional costs required for any pedestal and metering required as developed. This would equate to roughly \$1200 per lot for secondary extensions assuming a 150 foot service length. Using only the 39 lots from the first phase, this equates to roughly \$46,800 in required cost to provide these lots with secondary service.

The system is currently setup for expansion into the remaining Phases of development, however none of the facilities have been placed beyond the original phase. The City of South Haven Electrical Department reviewed what would be required to expand service



into the remaining phases assuming the development pattern remained as shown in the original design drawings. The following summarizes the anticipated costs for primary and secondary service per phase based on the development density originally proposed:

- Phase I Area (39 Lots)
 - Primary Service Completed
 - Secondary Service \$46,800
- Phase II Area (45 Lots)
 - Primary Service \$57,000
 - Secondary Service \$54,000
- Phase III Area (40 Lots)
 - Primary Service \$50,400
 - Secondary Service \$48,000
- Phase IV Area (43 Lots)
 - Primary Service \$54,200
 - Secondary Service \$51,600
- Overall Costs
 - Primary Service \$161,600
 - Secondary Service \$200,400
 - Total \$362,000

Since it is not known exactly what development pattern or density is anticipated, these numbers should only be used as a guideline for budgeting. The cost of providing individual electrical pedestals or additional features on each lot was not considered at this time for the same reason. Sites may vary in nature such as being setup for rustic camping, cabins, or another structure and thus the individual cost beyond providing electrical service to a given lot will vary. Once a concept plan is developed, the developer can work with the South Haven Electrical Department to determine the actual cost of these services.

Sanitary Sewer System

A site visit was conducted on March 28, 2018 to verify the condition of the sanitary network and to determine the extent to which the system was built. Each critical component of the system was reviewed and is described in further detail below.

Sanitary Sewer Main

The initial phase of construction included the installation of 2,700 feet of 8 inch Sanitary Sewer Main. The portion installed includes two (2) separate runs of sewer which service the northern and southern portions of the development. The southern run is approximately 800 feet long and runs from the primary entrance roadway to its outlet



onto 2nd Avenue. It is located mainly outside of the roadway on an undeveloped portion of the site which was cleared specifically for the installation of the utility. Future Phase II would be connected to this sanitary main.



Figure 2: Typical Sanitary Manhole Condition

The northern portion of sanitary sewer services the majority of the first phase of the development, and would be used for expansion into the Phase III and IV areas. This run of sewer makes up the remaining 1,900 feet installed and outlets directly into the lift station which was installed as part of the development.

A visual review of the sanitary manhole structures was conducted during the site investigation. The manholes and castings are generally in like new condition as they have not been subjected to sanitary flows or a large number of vehicular loads. There is evidence of calcium buildup in the flow channels which should be removed to ensure proper operation of the system.

Without performing CCTV analysis of the pipe network, which was beyond the scope of this investigation, it cannot definitively be determined what maintenance or repairs are needed on the system. Anticipated repairs, considering that the main has not been under any live flows, would likely involve minor maintenance work such as cutting any root intrusions and removing debris in the system.



CCTV and cleaning quotes were obtained for the system in April 2018 and were around \$6,000 for light cleaning of the system along with video documentation. This cost would also cover the aforementioned cleaning of the flow channels to remove calcium deposits to allow for the CCTV equipment to properly operate. This fee does not include inspection of the condition of sanitary laterals which were quoted at about \$100 per lateral.

Sanitary Services

The original Riverwoods development plans show a total of 39 six inch sanitary services which were to be installed as part of the first phase of work. Without video verification of the main lines, the locations and number of lines installed cannot be absolutely verified. Additionally, the construction documents indicate that sanitary cleanout risers were not required to be installed during construction, further complicating verification of lateral locations. The plan details show laterals installed with risers to a buried depth of 5 feet below grade and capped with a watertight plug.

During our site visit, there were indications that sanitary laterals were installed since wooden stakes and upturned HDPE pipes were located at what appeared to be the ROW limits. CCTV of the sanitary main should be completed to confirm the location of these services.

Force Main

Approximately 1000 feet of 4 inch ductile iron force main was installed as part of the initial stage of development. This force main connects the onsite lift station to the southern portion of the sanitary gravity network which ultimately outlets onto 2nd Avenue. The force main outlets into the northern side of what was indicated as MH 6 in the construction drawings. This connection was verified during the March site visit and confirmed again when the lift station was operated. The force main was to be installed to a typical minimum cover of 5 feet 9 inches per the previous drawings and is located principally outside of the pavement limits with a few minor crossings.

Lift Station

The lift station installed onsite was inspected by South Haven WWTP department staff in detail during the first two weeks of May 2018. The condition of the existing control panel, pumps, electrical equipment, and other related items were all reviewed at this time.





Figure 3: Riverwoods Lift Station Condition

In regards to the physical above ground condition of the lift station site, a few improvements will be required in order to fully certify the lift station as complete. The previous developer did not finish installation of a concrete pad around the station structure or the control panel. This will need to be completed to ensure City Staff can perform proper maintenance on the system and can access the station in the event of a power outage or other emergency. The original plans call for a 20 foot wide by 30 foot long pad at this location. In order to provide a proper base and a 6 inch thick concrete pad, including all needed cleanup and grading, around \$10,000 should be budgeted for this improvement.

Additionally, a 12 foot wide asphalt access route would also need to be installed from the roadway to the station to provide better access to the concrete pad for the aforementioned reasons. Assuming a 50 foot long drive with 3 inches of asphalt, a 6 inch aggregate base, and a 12 inch subbase with grading and necessary removals, around \$5,000 should be budgeted for this improvement.

The internal condition of the control panel can be seen in the image on the following page. The panel is in operating condition and was cleaned out by the City as a rodent nest was found upon opening the panel. The only upgrade required for the panel would be to switch out the existing network control system and upgrade to the City's new Mission system so that any alarms or issues can be relayed directly to City Staff. This upgrade would cost roughly \$1,500.



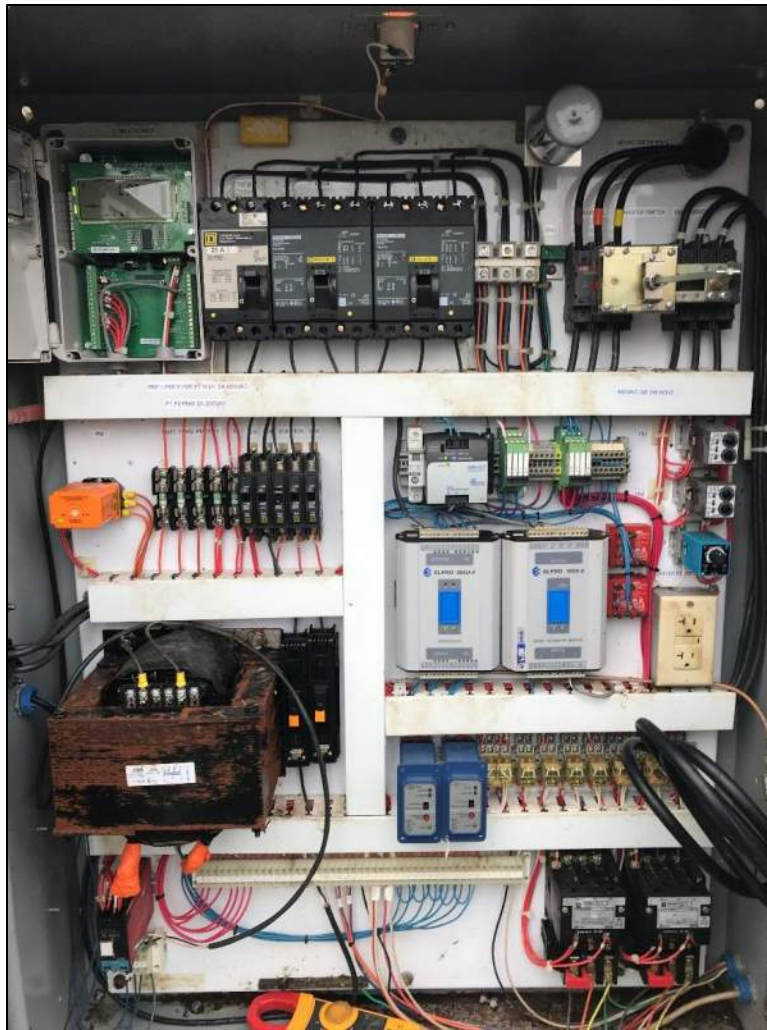


Figure 4: Riverwoods Lift Station Condition – Control Panel

An above ground odor control system was provided for the system which doses the raw waste with Ferric Chloride. This style of odor control system was used throughout the City during the 2008 time period in which this station was installed, however, the majority of these systems have been eliminated from the network due to the corrosive nature of the system. The pumps for this system are currently in storage at the South Haven Wastewater Treatment Plant. The above ground housing system for these pumps was damaged in a heavy wind storm at some point after its installation and has since been eliminated.

Since this system outlets directly to a gravity main which feeds into the WWTP, there is no requirement that a new odor control system be installed at this time. If the new owner of the site determines that a system is desired to mitigate odor on the newly developed property then a system other than Ferric Chloride should be used.

The 8 foot diameter pump chamber for the lift station was also reviewed and is in operational shape and does not appear to require any repair. Duplex Flygt NP 3127 Pumps are installed and are functioning as designed, providing approximately 100 GPM



against a design condition of 61.9 feet of total dynamic head. No flush valve was installed on these pumps. The wet well was full of water and was drawn down during the investigation in May of 2018 and the pumps operated properly for this task.

The valve vault is likewise in operational shape with no apparent needed repairs. The Flygt Model SX-2 dewatering pump located in the valve vault was used to clear out water from the vault and operated properly.

Sanitary Sewer System Summary

Overall the sanitary sewer network for the first phase of the development appears to be fully in place for the scheduled 39 lots. The condition of the network, based on a visual review, appears to be in good shape, however, a further investigation into the system using CCTV should be completed to ensure no unforeseen repairs are required.

The majority of noted improvements required are related directly to the lift station and include installation of a concrete pad around the station, providing a gravel or HMA access route to the station for access, and minor control panel repairs. Additionally, the developer may decide to install a Non-Ferric Chloride odor control treatment system for the lift station, if desired. Sanitary cleanouts should be installed on services coming off of the main to allow for flushing of the laterals once they are put into service.

Storm Sewer System

An internal investigation of the storm sewer network was not included in the scope of this study, however, a visual review of the system was conducted during the March site visit. The system for the Phase I area, similar to the sanitary sewer network, appears to have been fully installed. This includes all related storm sewers, manholes, and castings. These structures appeared to be in good condition but should be further investigated by the developer to ensure that no repairs are required.

Pavement

Record drawings were reviewed to determine the anticipated design pavement section for the development. Per these drawings, the ultimate pavement section was to be:

- 1.5 inches 3B Asphalt Mix (Top Course)
- 1.5 inches 4B Asphalt Mix (Base Course)
- 8.0 inches 22A Aggregate Base
- 12.0 inches Class II Sand Subbase

The previous developer installed the subbase, aggregate base, and base course asphalt layers during the initial phase of construction. To complete the pavement cross section, an additional 1.5 inches of top course asphalt should be installed to ensure the pavement section is adequate for traffic loading. This work is estimated to cost around \$61,000 to pave a 1.5 inch HMA section over the existing roadway system. Prior to construction, the



new developer should analyze the proposed traffic loadings to ensure proper thickness is provided.

Six (6) pavement corings were completed on March 30, 2018 to determine the thicknesses of the constructed pavement section throughout the development. Typically, the section meets the designed intention. These borings, along with a location map, have been attached to this report for reference.

The current asphalt has experienced minimal traffic over the course of the 10 plus years it has been installed, however it has also not received any maintenance. Since the pavement section was not fully installed the roadway was low around drainage structures and water was allowed to sit on the road surface. Further, typical pavement weathering of the surface has occurred due to rain and snow on the surface leading to cracking and water intrusion.

The image below is representative of some of the worst sections of pavement in the development. There is evidence of significant alligator cracking and raveling of the pavement surface which should be addressed prior to top course paving. Budgeting for pavement work should include roughly 50 percent base course asphalt removal and replacement along with compaction of the base where pavement was removed. The work is estimated at \$58,000 which includes milling out damaged pavement sections, compacting the base course, and repaving a 1.5 inch section of base course asphalt prior to paving new top course asphalt.



Figure 5: Riverwoods Pavement Condition



Gas Distribution Network

During the March 28, 2018 site visit gas markings and gas signage were noted throughout the development. Contact was made with the gas company (Michigan Gas Utilities) to obtain record drawings of the system that was installed as a part of the original development. A location map showing the rough placement of these mains is provided for reference. Per discussion with the gas company, these lines were installed around the same time as the original development in 2008.

The new system is 2.0 inch polyethylene main throughout the developed areas of the site, with stubs provided for the remaining phases of work. This system is connected to the existing network via a 2.0 inch aluminum gas main located on 2nd Avenue on the southern border of the site. The future developer should work with the gas company to provide gas services and expansion of the system as required for full buildout of the development.



Figure 6: Riverwoods Gas Utility Map



Overall Summary

The current development at the Riverwoods site included construction of the Phase I improvements as specified in the 2008 design drawings. Below is a summarized listing of the required improvements still required to finish the original design concept for Phase I or to make it ready for future campground development:

	<u>Cost</u>
• Water System	\$0
○ No improvements to the original system required	
○ System is setup for expansion into the adjacent phase areas	
• Electrical System	
○ Services to lots need to be installed as desired	\$1,200 per Lot
○ System is setup for expansion into the adjacent phase areas	TBD (Per Pg 4)
• Sanitary System	
○ System should be cleaned and have CCTV work completed to verify its condition and service locations	\$10,000
○ Sanitary services appear to be installed, however cleanouts will need to be installed to allow for flushing of the services	\$500 Each
○ The lift station is fully operational however some minor improvements are still required including switching out the communication system to the new City standard, pouring a concrete pad around the station, and providing an access road to the station.	\$16,500
○ An odor control system may also optionally be installed however the system must not utilize ferric chloride.	TBD
• Storm System	\$0
○ Only a visual review of this system was completed however it appears that the system in the first phase of construction was fully completed	
• Pavement	
○ The pavement section has been installed except for the remaining 1.5 inches of top course	\$61,000
○ Prior to placing top course pavement, approximately 50 percent of the existing base course should be removed, the base compacted, and repaved to eliminate sections with excessive wear.	\$58,000
• Gas Distribution Network	
○ The gas distribution main has been installed in the first phase area as shown on the previously attached drawing from Michigan Gas	\$0
○ Gas services will need to be installed as required to lots	\$200 Each

Attachments:

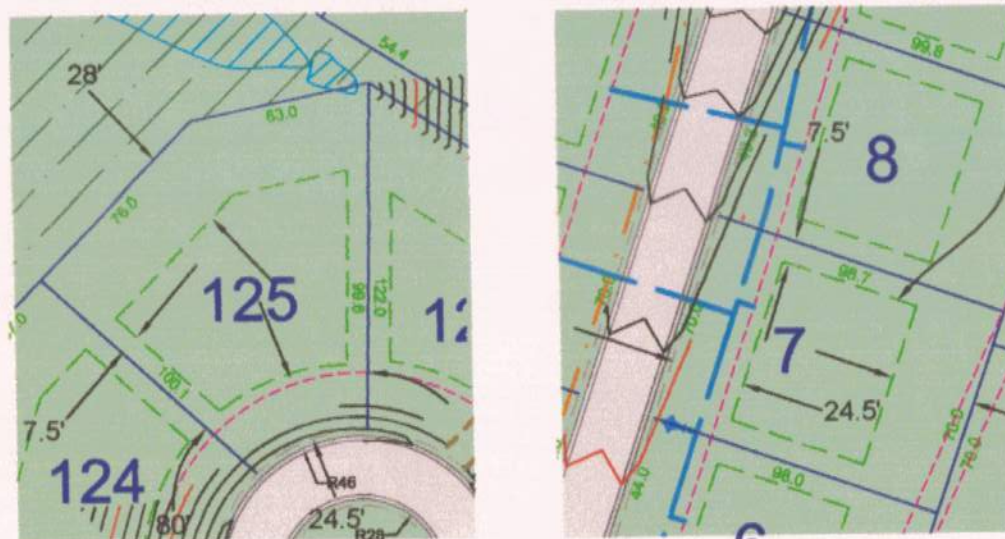
2008 Riverwoods Site Plan
Electrical System Layout

Fire Flow Testing Report
Pavement Coring Report





SITE LOCATION MAP
NO SCALE



TYPICAL LOT DESIGN
NO SCALE

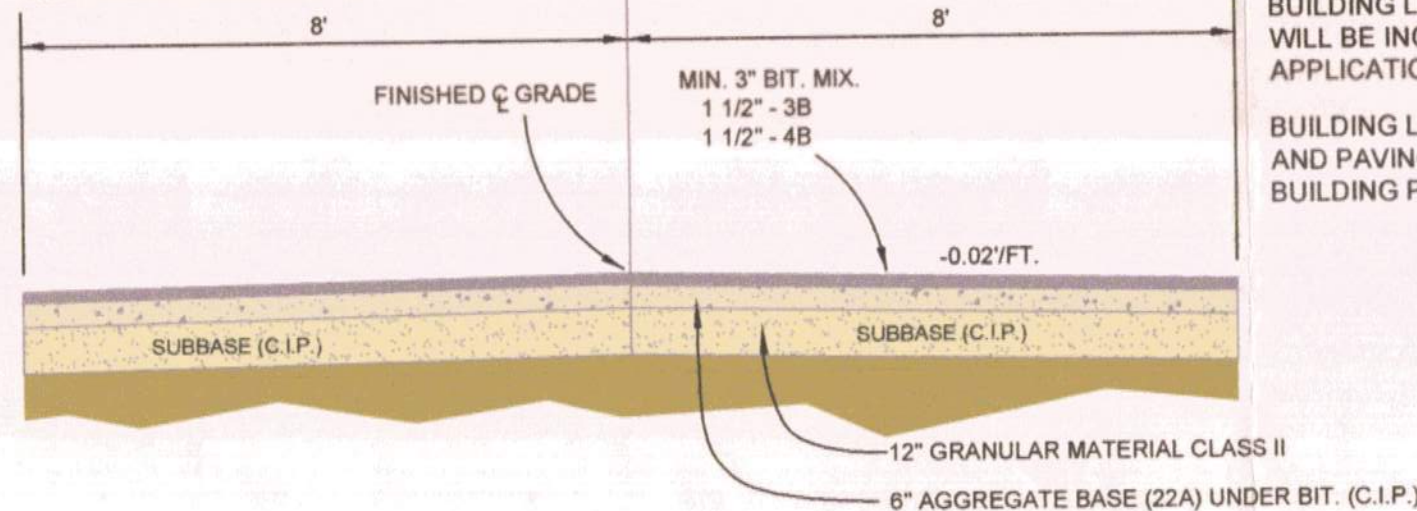
EXISTING ZONING (HDR) - HIGH DENSITY RESIDENTIAL
MINIMUM LOT AREA: 10,000 SQUARE FEET
MINIMUM LOT WIDTH: 80 FEET
LOT COVERAGE: 30%

SETBACKS IN HDR DISTRICT
FRONT - 35 FEET
SIDE - 10 FEET
REAR - 40 FEET
FROM BLUE STAR HIGHWAY - 110' FROM CENTERLINE

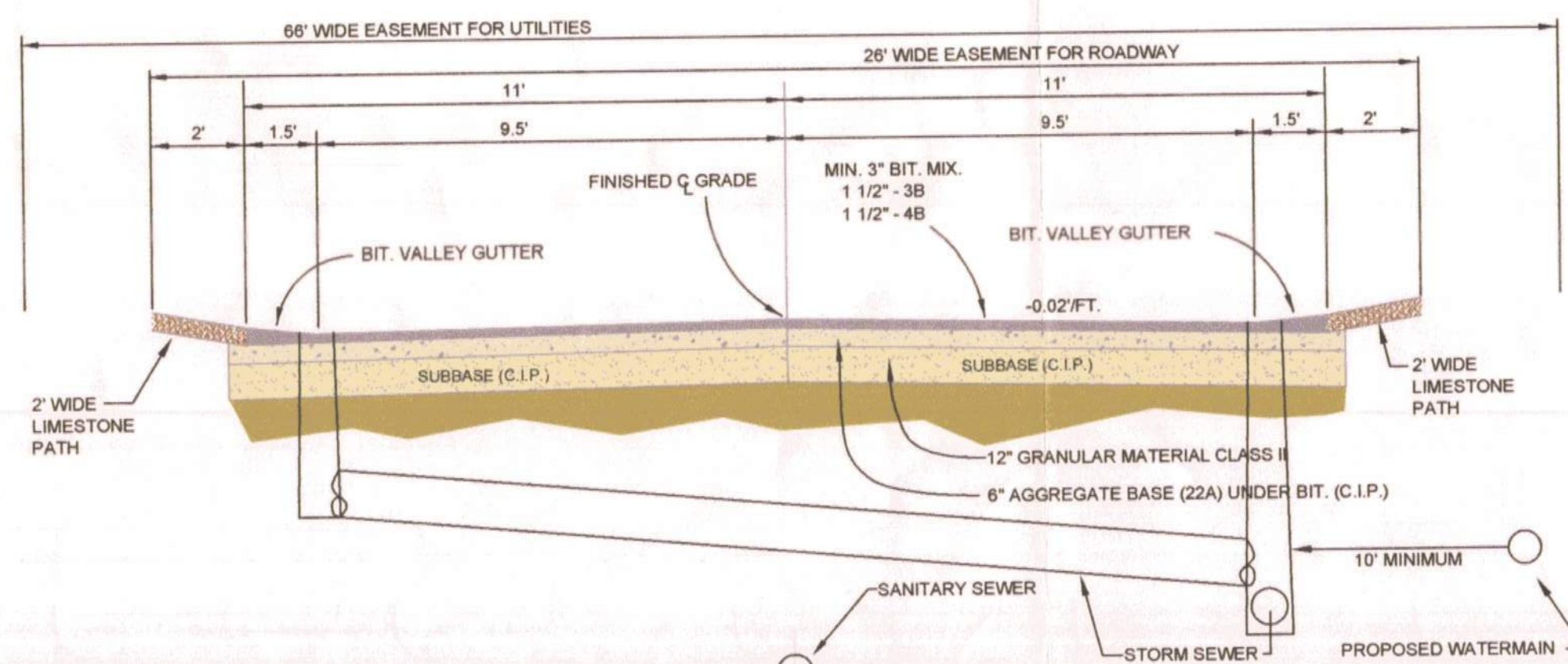
ALLOWED SETBACKS IN PUD (30% REDUCTION)
FRONT - 24.5' (AS MEASURED FROM 26' EASEMENT FOR ROADWAY)
SIDE - 7.5'
REAR - 28'

PUD
TOTAL GROSS AREA OF PARCEL = 56.94 ACRES
ALLOWABLE UNITS = (56.94) (43,560) = 232 UNITS
10,000 SFT/UNIT
NUMBER OF UNITS PROPOSED = 167 UNITS + CLUBHOUSE

AREA OF PARCEL
HDR = 51.66 ACRES
HDR LESS BLUE STAR HWY. ROW AND 2ND AVE ROW = 44.21 ACRES
RD = 5.28 ACRES
RD LESS BLUE STAR HWY ROW = 4.17 ACRES
TOTAL = 56.94 ACRES
NET AREA = 49.506 ACRES



TYPICAL PRIVATE DRIVE SECTION
NO SCALE



TYPICAL ROAD SECTION
NO SCALE

PROPOSED FISHING PIER
PROPOSED BOAT LANDING
PROPOSED BOAT LANDING
PROPOSED BOARDWALK
PROPOSED BOAT LANDING
PROPOSED FISHING PIER
PROPOSED BOAT LANDING
PROPOSED ENTRANCE AS APPROVED BY MDOT AND PERMITTED BY VAN BUREN COUNTY ROAD COMMISSION

OPEN SPACE AREAS
AREA A = 43,090 SFT.
AREA B = 145,883 SFT.
AREA C = 141,609 SFT.
AREA D = 41,774 SFT.
AREA E = 84,625 SFT.
AREA F = 19,493 SFT.
TOTAL OPEN SPACE = 476,474 SFT.

APPROXIMATE LOCATION OF PROPOSED CLUBHOUSE AND POOL SITE
BUILDING LOCATION, ELEVATIONS AND PAVING WILL BE INCLUDED WITH BUILDING PERMIT APPLICATION. SEE PLAN BY ARCHITECT
BUILDING LOCATION, ELEVATIONS AND PAVING WILL BE INCLUDED WITH BUILDING PERMIT APPLICATION

PROPOSED STORMWATER MANAGEMENT AREAS

"A" = 93,374 CUBIC FEET
"B" = 28,626 CUBIC FEET
"C" = 8,340 CUBIC FEET
"D" = 19,390 CUBIC FEET
"E" = 7,396 CUBIC FEET
"F" = 7,656 CUBIC FEET
"G" = 39,016 CUBIC FEET
"H" = 11,112 CUBIC FEET
"I" = 6,622 CUBIC FEET
"J" = 7,924 CUBIC FEET
"K" = 5,204 CUBIC FEET
RIP RAP AREAS = 250 CUBIC FEET

PROPOSED STORMWATER MANAGEMENT AREA
ZONING BOUNDARY LINE
APPROXIMATE LIMITS OF WETLANDS

STREET LIGHTING IS NOT PROPOSED. LIGHTING WILL BE PROVIDED VIA FIXTURES ON THE INDIVIDUAL UNITS AND AT APPROPRIATE COMMON AREA LOCATIONS

PRIVATE ROADWAY DESIGN AND PROFILE WILL BE PROVIDED IN ACCORDANCE WITH SOUTH HAVEN TOWNSHIP PRIVATE ORDINANCE

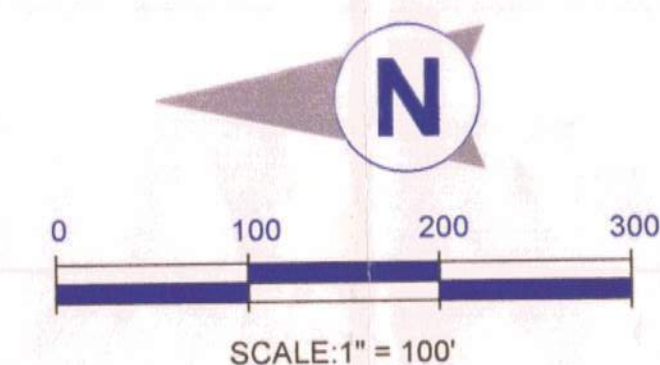
BOUNDARIES OF INDIVIDUAL UNITS (LOT LINES) MAY BE REVISED IN DESIGN ENGINEERING TO AFFORD NECESSARY BUILDING ENVELOPES AND PRESERVE EXISTING TREES

THIS SITE PLAN SCHEMATICALLY PRESENTS PROPOSED LAND USE

PROPOSED DRAINAGE, PRIVATE ROADWAY AND UTILITIES WILL BE DESIGNED IN ACCORDANCE WITH APPROPRIATE AGENCY REVIEWS

APPROXIMATE LIMITS AND MODIFICATIONS TO REGULATED AREAS TO BE APPROPRIATELY REVIEWED AND PERMITTED BY MDEQ

EXISTING CONTOUR LINE (TYPICAL)



CONSTRUCTION OF PROJECT SHALL BE PERFORMED TO INSURE NO DAMAGE WILL OCCUR TO EXISTING TREES, TRUNKS, LIMBS OR BARK

OWNER WILL RESTORE 2ND AVENUE IN ACCORDANCE WITH REQUIREMENTS OF VAN BUREN COUNTY ROAD COMMISSION

Project Name: Riverwoods Utility Investigation

 Project No.: 18-0339

 Client: MDNR

 Date: 4/2/2018

 Tested By: Mark Anthony

 Flow Hydrant Location: 917

 Test Hydrant Location: 918

Hydrant Flow Test Report

Hydrant ID #	Watermain Diameter (inches)	Nozzle Size (inches)	Discharge Coefficient	Static Pressure (psi)	Pitot Pressure (psi)	Residual Pressure (psi)	Hydrant Flow (gpm)
917	A	8	2.5	0.90	71	39	1048
918	B	8			71	60	Class AA

"A" is the flow hydrant.

"B" is the test hydrant (residual hydrant).

Hydrant Flow:

$$Q_{Hyd} (GPM) = 29.84 * C * D^2 * \sqrt{P}$$

C = Coefficient of Discharge

D = Diameter (Inch)

P = Pitot Pressure (PSI)

Available Flow:

$$Q_{20 PSI} (GPM) = Q_{Hyd} * \left(\frac{Static - 20}{Static - Residual} \right)^{0.54}$$

Discharge Type Coefficient



Outlet Smooth & Rounded

C = 0.90



Outlet Square & Sharp

C = 0.80



Outlet Square & Projecting into Barrel

C = 0.70

Remarks:

East Jordan Iron Works Hydrants - Other Hydrant 915

Setup static gauge on Hydrant 918 and flow tested Hydrant 917

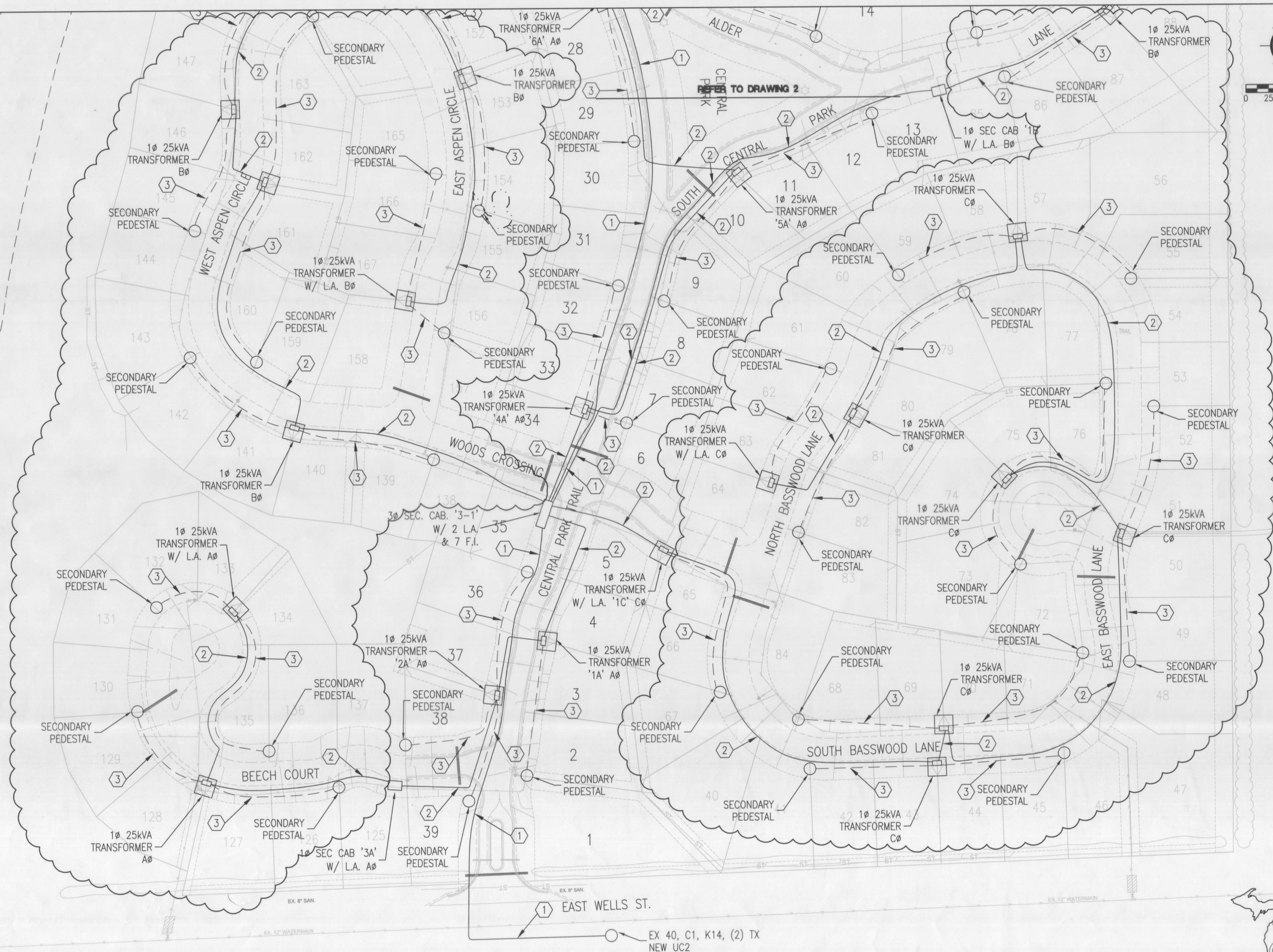
When Hydrant 917 was turned on pressure at 918 read 60 PSI after stabilization.

Available Flow at 20 PSI = 2400 GPM

- NOTES:
1. ALL ROAD CROSSING TO BE DIRECTIONAL BORED.
 2. MINIMUM COVERAGE TO BE 36" FOR ALL VOLTAGES AT ROAD CROSSINGS.
 3. ALL D. BORES TO BE 4" PVC SCH 40 OR EQUAL CONDUIT.
 4. EACH ROAD CROSSING TO HAVE SEPERATE CONDUIT.

- UNDERGROUND CONDUCTOR LEGEND
- 1 3-1/C #2 15KV AL. FULL C.N. EPR - DIRECT BURIED
 - 2 1-1/C #2 15KV AL. FULL C.N. EPR - DIRECT BURIED
 - 3 2-1/C 350KCM, 1-1/C #4/0 600V USE-2 "WESLEYAN" - DIRECT BURIED

NOT INCLUDED IN PHASE I



ENG.	RAS		
DR.	KMW		
CK.	RAS		
APP.	PKM		
DATE	12-13-2007	OWNER REVIEW	ISSUED FOR



PETOSKEY, MICHIGAN, 231-439-9683
GRAND RAPIDS, MICHIGAN, 616-942-7183

CITY OF SOUTH HAVEN

RIVERWOODS ON THE TRAIL

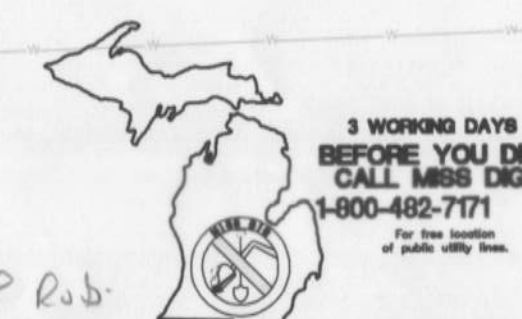
ELECTRICAL DISTRIBUTION - UNDERGROUND LAYOUT

SOUTH HAVEN, MICHIGAN

PROJECT
NUMBER
07-0233.01

DRAWING
NUMBER
1

Final Issue from GRP Rob

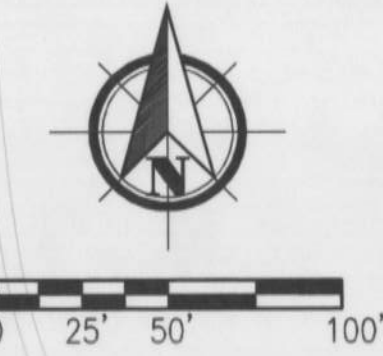


- NOTES:
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 4. EACH ROAD CROSSING TO HAVE SEPERATE CONDUIT.

UNDERGROUND CONDUCTOR LEGEND

- 1 3-1/C #2 15KV AL 1/3rd C.N. EPR
- DIRECT BURIED
- 2 1-1/C #2 15KV AL 1/3rd C.N. EPR
- DIRECT BURIED
- 3 2-1/C 350KCM, 1-1/C #4/0 600V
USE-2 "WESLEYAN" - DIRECT BURIED

NOT INCLUDED
IN PHASE I



ENG.	RAS
DR.	KMW
CK.	RAS
APP.	PKM
DATE	12-13-2007
ISSUED FOR	OWNER REVIEW



PETOSKEY, MICHIGAN, 231-439-9683
GRAND RAPIDS, MICHIGAN, 616-942-7183

CITY OF SOUTH HAVEN

RIVERWOODS ON THE TRAIL

ELECTRICAL DISTRIBUTION - UNDERGROUND LAYOUT

SOUTH HAVEN, MICHIGAN

PROJECT
NUMBER
07-0233.01

DRAWING
NUMBER
2



3 WORKING DAYS
BEFORE YOU DIG
CALL MISS DIG
1-800-482-7171
For more details
of public utility lines.



SITE LOCATION MAP



TYPICAL LOT DESIGN

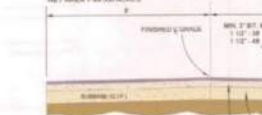
SETBACKS:
FRONT - 10 FEET
SIDE - 10 FEET
REAR - 10 FEET
FROM BLUE STAR HIGHWAY - 10' FROM CENTERLINE

ALLOWED SETBACKS IN PUD (OWN REDUCTION):
FRONT - 24' (AS MEASURED FROM 25' EASEMENT FOR ROADWAY)
SIDE - 7' 2"
REAR - 30'

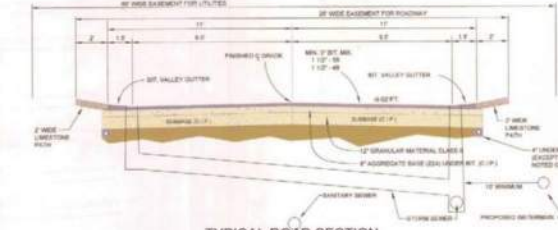
PERMITS:
TOTAL GROSS AREA OF PARCEL = 38.84 ACRES
ALLOWABLE UNITS - (OR 50 LOTS) = 232 UNITS
(10,000 SQ FT/LU)

NUMBER OF UNITS PROPOSED - 187 UNITS + CLUBHOUSE

AREA OF PARCELS:
HOR = 11.86 ACRES
HOR LESS BLUE STAR HWY ROW AND 2ND AVE ROW = 11.21 ACRES
RD = 1.53 ACRES
RD LESS BLUE STAR HWY ROW = 4.17 ACRES
TOTAL = 28.67 ACRES
NET AREA = 48.08 ACRES



TYPICAL PRIVATE DRIVE SECTION



TYPICAL ROAD SECTION



PROPOSED STORMWATER MANAGEMENT AREA
ZONING BOUNDARY LINE
APPROXIMATE LIMITS OF NEIGHBORHOODS

STREET LIGHTING IS NOT PROPOSED. LIGHTING WILL BE PROVIDED ON FEATURES ON THE INDIVIDUAL UNITS AND AT APPROPRIATE COMMON AREA LOCATIONS.

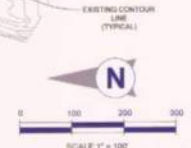
PRIVATE ROADWAY DESIGN AND PROFILE WILL BE PROVIDED IN ACCORDANCE WITH SOUTH HAVEN TOWNSHIP PRIVATE ORDINANCE.

BOUNDARIES OF INDIVIDUAL UNITS (LOT LINES) MAY BE REVISED IN DESIGN ENGINEERING TO AVOID NECESSARY BUILDING ENVELOPES AND PRESERVE EXISTING TREES.

THIS SITE PLAN SCHEMATICALLY PRESENTS PROPOSED LAND USE.

PROPOSED DRAINAGE, PRIVATE ROADWAY AND UTILITIES WILL BE DESIGNED IN ACCORDANCE WITH APPROPRIATE AGENCY REQUIREMENTS.

APPROXIMATE LIMITS AND MODIFICATIONS TO REGULATED AREAS TO BE APPROPRIATELY REVIEWED AND PERMITTED BY MEANS.



OWNER WILL RESTORE 2ND AVENUE IN ACCORDANCE WITH REQUIREMENTS OF VAN BUREN COUNTY ROAD COMMISSION.

[illegible]